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NOTICE OF ALLOWANCE AND FEE(S) DUE

23413 7590 08/25/2009

CANTOR COLBURN, LLP
20 Church Street
22nd Floor
Hartford, CT 06103

EXAMINER

MANDEVILLE, JASON M

ART UNIT

PAPER NUMBER

2629

DATE MAILED: 08/25/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,722	03/19/2004	Beohm-Rock Choi	21C-0081	7498

TITLE OF INVENTION: FOUR-COLOR DATA PROCESSING SYSTEM

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	11/25/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

23413 7590 08/25/2009
CANTOR COLBURN, LLP
 20 Church Street
 22nd Floor
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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Boehm-Rock Choi

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TITLE OF INVENTION: FOUR-COLOR DATA PROCESSING SYSTEM

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nonprovisional	NO	\$1510	\$300	\$0	\$1810	11/25/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
MANDEVILLE, JASON M	2629	345-077000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
 Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 756 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 756 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/804,722

Examiner

JASON M. MANDEVILLE

Applicant(s)

CHOI ET AL.

Art Unit

2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 07 August 2009.
2. ☒ The allowed claim(s) is/are 19, 20, and 24-35 (now renumbered 1-14).
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Noah J. Hayward on 19 August 2009.

1. The application has been amended as follows:

2. **Claims 1-18** are Canceled.

3. Amended **Claim 19** now reads:

19. An organic electro-luminescent display (OELD) device for processing multi-color gray-scale data, comprising:

a four-color converting part to generate gamma-converted RGB data by performing gamma conversion with respect to primary RGB gray-scale data by multiplying each component of the primary RGB gray-scale data by a value of an

inverse of a corresponding maximum gray-scale level, to extract a white color component from the gamma-converted RGB data, to generate four-color RGBW data by subtracting the white color component from the gamma-converted RGB data and by adding white gray-scale data to the gamma-converted RGB data, and to perform reverse gamma conversion on the four-color RGBW data to generate compensated RGBW gray-scale data;

a data driving part to process the compensated RGBW gray-scale data provided from the four-color converting part to generate four-color signals in an analog type;

a scan driving part to generate scan signals in sequence; and

an OLED panel to emit light with a color in response to the four-color signals from the data driving part and the scan signals from the scan driving part, wherein

a white extracting part is configured to determine which color data of the gamma-converted RGB data has a minimum value and to compare the minimum value with a predetermined value relative to the maximum gray scale level and corresponding to a half luminance of the maximum gray scale level,

the white extracting part generates the minimum value of the gamma-converted RGB data as the white color component if the minimum value is smaller than the predetermined value, and

the white extracting part generates the predetermined value as the white color component if the minimum value is larger than the predetermined value.

4. **Claims 21-23 and 36-44** are Canceled.

Allowable Subject Matter

5. **Claims 19, 20, and 24-35** (now renumbered **Claims 1-14**) are allowed.
6. The following is an examiner's statement of reasons for allowance: none of the references relied upon by the examiner, considered alone or in reasonable combination, teach or fairly suggest an organic electro-luminescent display (OELD) device for processing multi-color gray-scale data, comprising the four-color converting part to generate gamma-converted RGB data, to extract a white color component from the gamma-converted RGB data, to generate four-color RGBW data, and to perform reverse gamma conversion on the four-color RGBW data to generate compensated RGBW gray-scale data; the data driving part to process the compensated RGBW gray-scale data provided from the four-color converting part; the scan driving part to generate scan signals in sequence; and the OELD panel, wherein a white extracting part is configured to determine which color data of the gamma-converted RGB data has a minimum value and to compare the minimum value with a predetermined value relative to the maximum gray scale level and corresponding to a half luminance of the maximum gray scale level, the white extracting part generates the minimum value of the

gamma-converted RGB data as the white color component if the minimum value is smaller than the predetermined value, and the white extracting part generates the predetermined value as the white color component if the minimum value is larger than the predetermined value, as positively recited in independent **Claim 19** (now renumbered **Claim 1**).

As pertaining to the most pertinent prior art referenced by the examiner, Hirano et al. (hereinafter "Hirano" US 7,277,075) explicitly discloses (see Fig. 1, Fig. 3a, and Fig. 3b) a display device comprising a four-color converting part (6; see Fig. 3b) to generate converted RGB data (i.e., (Ri, Gi, Bi)), to extract a white color component (i.e., Yimin) from the converted RGB data, to generate four-color RGBW data (i.e., (Ro, Go, Bo, Wo)); the data driving part (3; see Fig. 1) to process the compensated RGBW gray-scale data provided from the four-color converting part (6; see Fig. 3b); the scan driving part (2) to generate scan signals in sequence; and the panel (1), wherein a white extracting part (see (6, 7, 8) in Fig. 1 and Fig. 3b) is configured to determine which color data of the gamma-converted RGB data has a minimum value (i.e., Yimin) and to compare the minimum value (Yimin) with a predetermined value (i.e., Yimax) relative to the maximum gray scale level (see Col. 6, Ln. 56-62 along with Col. 5, Ln. 17-51 and Col. 5, Ln. 65-67 through Col. 6, Ln. 1-7 and Col. 4, Ln. 62-67 through Col. 5, Ln. 1-3).

Takayama (US 6,317,157) discloses (see Fig. 1 and Fig. 2) a generic display device in which an input RGB is adapted to comply with any number of receiving display devices by generating gamma-converted RGB data with respect to primary RGB gray-scale data and by performing reverse gamma conversion of the RGB data prior to

display (see Col. 1, Ln. 29-63 and Col. 2, Ln. 14-51; also see Col. 6, Ln. 13-67 and Col. 7, Ln. 9-47 and Col. 7, Ln. 66-67 through Col. 8, Ln. 1-16). The teachings of Takayama are clearly applicable to the teachings of Hirano as Takayama teaches that the display performance is improved when gamma properties are taken into consideration when performing arithmetic operations on RGB input data (see Abstract, for example).

However, neither Hirano nor Takayama alone or in combination teach or fairly suggest that a white extracting part is configured to determine which color data of the gamma-converted RGB data has a minimum value and to compare the minimum value with a predetermined value relative to the maximum gray scale level and corresponding to a half luminance of the maximum gray scale level, the white extracting part generates the minimum value of the gamma-converted RGB data as the white color component if the minimum value is smaller than the predetermined value, and the white extracting part generates the predetermined value as the white color component if the minimum value is larger than the predetermined value. The most pertinent prior art utilized by the examiner, namely Tanioka (US 5,929,843), discloses (see Fig. 10A-10C) an image processing apparatus and associated method of processing image data comprising the steps of extracting a white component from RGB data and generating RGBW data in order to display a full color image (see Abstract). Tanioka further discloses the implementation of a predetermined value (i.e., C)) by which the white color component is compared. Tanioka discloses that when the white color component is smaller than the predetermined value, the white color component is set to zero, and when the white

color component is larger than the predetermined value, the white color component is set to some factor of the minimum of the RGB data (see Col. 8, Ln. 18-67 through Col. 9, Ln. 1-45). However, Tanioka does not teach or fairly suggest that the predetermined value is determined relative to the maximum gray scale level and corresponding to a half luminance of the maximum gray scale level. As such, Tanioka does not teach or fairly suggest the claimed white extracting part wherein the white extracting part generates the minimum value of the gamma-converted RGB data as the white color component if the minimum value is smaller than the predetermined value, and the white extracting part generates the predetermined value as the white color component if the minimum value is larger than the predetermined value. In fact, none of the references relied upon by the examiner, alone or in reasonable combination, teach or fairly suggest the implementation of the claimed predetermined value. Therefore, **Claims 19, 20, and 24-35** (now renumbered **Claims 1-14**) are allowed.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON M. MANDEVILLE whose telephone number is 571-270-3136. The examiner can normally be reached on Monday through Friday 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexander Eisen can be reached on 571-272-7687. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jason Mandeville
Examiner
Art Unit 2629

/J. M. M./
Examiner, Art Unit 2629

***/Alexander Eisen/
Supervisory Patent Examiner, Art Unit 2629***